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For: FLUID RESERVOIR FOR A PAINT SPRAY GUN

**SUBSTITUTE SPECIFICATION**

## **FLUID RESERVOIR FOR A PAINT SPRAY GUN**

### **Field of the Invention**

The invention relates to a fluid reservoir for a paint spray gun.

### **Background of the Invention**

Such a fluid reservoir is known from prior art, for instance, WO 98/32539. This fluid reservoir is provided for one time use and comprises a container of plastic and a lid that can be placed thereon to close off the container. On the lid, connecting means are provided for placing the fluid reservoir on and fastening it to a paint spray gun or an adapter mounted thereon. In this case, the fluid reservoir is placed "upside down" on the paint spray gun, i.e., with lid side down. The paint present in the fluid reservoir then flows by gravity downwards into the paint inlet channel of the paint spray gun. In order to allow the gravity driven flow of paint, it is necessary for the pressure in the interior and that in the environment to be equalized. In order to guarantee this equalization, a ventilation part that can be closed by means of an adhesive tape or a manually operable valve is made in the container's bottom.

All the devices from prior art for closing the ventilation part have proved inadequate with regard to their tightness. Even with a valve mechanism, it cannot be reliably assured that paint will not escape through the ventilation part when the paint filled fluid reservoir is set down on its base.

Starting from this point, the invention is based on the problem of refining the fluid reservoir as known from prior art such that a flow of paint through the ventilation part is reliably prevented.

### **Summary of the Invention**

This problem is solved by fluid reservoir with the characteristics of Claim 1. Advantageous refinements of this fluid reservoir can be deduced from the subordinate claims.

## **Brief Description of the Drawings**

The invention will be explained in detail below on the basis of one embodiment with reference to the appended drawing. The drawings show:

Figure 1, oblique side view of a fluid reservoir according to the invention;

Figure 2, oblique representation of the container of the fluid reservoir according to the invention from Figure 1, in a view from obliquely below;

Figure 3, detail view of area Y from Figure 2;

Figure 4, sectional representation of a valve for closing the ventilation part in the receptacle bottom of the fluid reservoir from Figure 2, wherein the valve is shown in the closed position in Figure 4(a) and in the opened position in Figure 4(b);

Figure 5, side view of the fluid reservoir according to the invention, wherein the receptacle is represented in cross section and detail views of areas X and Y are shown;

Figure 6, sectional representation of the fluid reservoir of Figure 1 in the area of the lid;

Figure 7, top view onto an alternative embodiment of a valve for closing the ventilation part in the receptacle bottom (Figure 7a) and sectional representations of this alternative embodiment along line A – A (Figure 7b) and along line B – B (Figure 7c), wherein the valve is shown in the opened position;

Figure 8, representation of the alternative embodiment of the valve, shown as in Figure 7, but in the closed position of the valve.

## **Detailed Description of the Invention**

As shown in Figure 1, the fluid reservoir according to the invention comprises a cup shaped receptacle 1 and a lid 2 that can be screwed onto it by way of a thread 19. Thread 19 formed on the upper rim of receptacle 1 for screwing lid 2 on is recognizable in Figure 2. On its upper side, lid 2 has an outlet neck 20 with an outlet opening 19, not shown in Figure 1. A connecting element 3 is formed on the outer side of outlet neck 20. Connecting element 3 serves for placing and fastening the fluid reservoir on a paint spray gun or on an adapter arranged between the paint spray gun and the fluid reservoir. In the embodiment shown in the figures, connecting element 3 comprises a thread 21 and a

wedge shaped groove 22 that cooperate with corresponding connecting elements of the paint spray gun, namely a matching inside thread and a pin for engagement in groove 22.

Receptacle 1 is cup shaped with a circular receptacle bottom 23 and sidewall 24 opening upward slightly conically, as is evident from Figure 2.

The fluid reservoir is shown in a side view in Figure 5, wherein receptacle 1 is shown in section. The central area of receptacle bottom 23 is shown in detail view X of Figure 5. A hollow cylindrical projection 10, wall 29 of which projects vertically outward from receptacle bottom 23, is formed on receptacle bottom 23. Projection 10 is integral with receptacle bottom 23. Central axis A of hollow cylindrical projection 10 is arranged concentrically to the central axis of receptacle 1. A ventilation part 4 is formed in receptacle bottom 23, likewise concentrically to axis A. Ventilation part 4 is enclosed by an annular wall 8. A radially running annular rib 17 is formed on outer side 9 of wall 29. It is evident from the representation of Figure 3 that a plurality of depressions 18, which are arranged segment by segment in the radial direction with a distance between one another, are provided in outer side 9. Depressions 18 extend axially from upper edge 30 of projection 10 to roughly half the height of projection 10 (Figure 4). Openings can also be provided instead of depressions 18.

As is illustrated in Figure 5, two closure elements 5 are formed onto lid 2, each via pull off tabs 25. Pull off tabs 25 are formed as predetermined breakage points so that closure elements 5 can be torn manually away from lid 2 without the aid of tools. Closure elements 5 are each identical to the other, and serve to close ventilation part 4 on the one hand and to close outlet opening 19 on the other.

As is evident from detail view Y in Figure 5, closure element 5 has a hollow cylindrical base body 11 and a lid 26 formed integrally with it. In a central area, lid 26 is indented into the interior of base body 11, that is, downwards in the detail view Y of Figure 1, in order to form a plug 12. A stopper 13 tapering conically downwards is formed on the underside of this plug 12. The underside 27 of stopper 3 projects past lower edge 28 of base body 11. Two annular grooves 15 and 16, running parallel and apart from one another, are formed on the outer side of hollow cylindrical base body 11.

One of the two closure elements 5 cooperates with projection 10 to form a valve for closure of ventilation part 4, with projection 10 projecting from receptacle bottom 23

forming the housing and closure element 5 forming the valve cover. The valve is constructed here as a double seat valve, with two valve seats arranged one after the other in the direction of flow and separated from one another. Each valve seat has its own sealing surface, 6 and 7, respectively. The cooperation of closure element 5 and projection 10 to form the valve with which ventilation part 4 can be closed off is shown in detail in Figure 4. For this purpose, closure element 5 is pushed over projection 10, so that hollow cylindrical base body 11 embraces the cylindrical wall of projection 10. In order to guarantee a tight contact of closure element 5 on projection 10, the inside diameter of hollow cylindrical base body 11 and the outer diameter of hollow cylindrical projection 10 are roughly equally large.

The valve formed by closure element 5 and projection 10 can be fixed in two valve positions by cooperation of grooves 15 and 16 on the inner side of base body 11 and annular rib 17 on the outer side of projection 10. In the valve position shown in Figure 4(a), annular rib 17 engages with upper annular groove 15 and lower edge 28 of hollow cylindrical base body 11 rests on receptacle bottom 23. At the same time, stopper 13 engages with ventilation part 4. The outer surface of stopper 13 rests tightly against wall 8 of ventilation part 4 in this case. In this manner, a first valve seat with a first sealing surface 6 is formed. At the same time, a second sealing surface 7 separated from first sealing surface 6 is formed by virtue of the fact that the inner side of base body 11 rests tightly against outer wall 9 of hollow cylindrical projection 10. In this valve position, ventilation part 4 is tightly closed by the first valve seat (which is formed by the engagement of stopper 13 with ventilation part 4) on the one hand and, on the other, by way of the second valve seat (which is formed by the contact of inner side 14 of base body 11 with the lower periphery of outer wall 9). If a small amount of paint were to flow out of ventilation part 4 through the first valve with first sealing surface 6, the further flow of paint out of receptacle 1 is prevented by the second valve seat.

To open ventilation part 4, closure element 5 can be brought into a second valve position, as illustrated in Figure 4(b). For this purpose, the closure element is raised upwards, that is, away from receptacle bottom 23, until annular rib 17 engages with lower annular groove 16 (Figure 4(b)). To facilitate this raising of closure element 5 from the first to the second valve position and to detach the initial seating of annular rib 19 in

upper annular groove 15, it is advantageous for lid part 26 of closure element 5 to project laterally past base body 11. On the one hand, an easier gripping of the closure element on lid 26 is made possible thereby, and on the other, the engagement of annular rib 17 in upper annular groove 15 of lid 26 can be released, because the inside diameter in the area of base body 11 is enlarged by bending this projecting part of lid part 26 upwards.

In the second valve position shown in Figure 4(b), stopper 13 is disengaged from ventilation part 4 so that the latter is opened up. At the same time, the second valve seat is also released, since lower edge 28 of base body 11 lies in the area of depressions 18 on the outer side of projection 10 in this valve position, as is evident from Figure 4(b), right side. In this position, it is possible for air to pass from the interior of receptacle 1 through ventilation part 4 and through the passageway formed between depressions 18 and inner side 14 of base body 11.

The second closure element 5 formed on lid 2, which is formed identically to the other closure element 5, can be used for closing off outlet opening 19 on the connecting element of lid 2 in that this closure element 5 is first broken off lid 2 and then placed on outlet neck 20. The inside diameter of base body 11 and the outside diameter of outlet neck 20 are matched to one another for this purpose, so that inner side 14 of base body 11 rests tightly against the outer side of neck 20, as shown in Figure 6.

Another embodiment of a valve for closing off ventilation part is illustrated in Figure 7. Figure 7a shows a top view of this valve which, just like the above described valve, has two valve seats arranged one behind the other in the direction of flow. Identical components of this valve are furnished with the same reference numbers as in Figures 3-5. As in the embodiment shown in those figures, projection 10 also forms the valve housing in the valve shown in Figure 7, and a closure element 5 forms the valve cover. The valve is likewise constructed as a double valve with two valve seats separated from one another, each valve seat having its own sealing surface 6 and 7, respectively. Closure element 5 is pushed over projection 10 such that it grips it, with hollow cylindrical base body 11 embracing the cylindrical wall of projection 10. In the center, closure element 5 has a cylindrical stopper 13, which engages with ventilation part 4 in the closed valve position and forms first sealing surface 6 there. Second sealing surface 7

is again formed on outer wall 9 of projection 10, where inner surface 14 of closure element base body 11 rests against it.

Unlike the embodiments of Figures 3-5, closure element 5 shown in Figure 7 is not seated on projection 10 via an engagement mechanism, but rather grips it. Closure element 5 can be displaced between a first limit position and a second limit position, with the valve being opened in the first limit position, as shown in Figures 7a and 7b, and closed in the second limit position, as shown in Figures 8a and 8b. An annular rib 17a is formed on the outer side of projection 10. An annular groove 15a in closure element 5, which cooperates with annular rib 17a to form two stops in the first and second valve position, is provided on the inner surface of hollow cylindrical base body 11. In the valve position shown in Figure 7, the lower edge of annular groove 15a rests against annular rib 17a, and in the closed valve position shown in Figure 8, the upper edge of annular groove 15a rests against annular rib 17a. Between these two positions, closure element 5 is displaceable relative to projection 10.

In an embodiment of the fluid reservoir not represented graphically here, it is provided that ventilation part 4 is first closed off by a thin membrane, and is then punctured into the first valve position only upon insertion of closure element 5 by pushing a sharp point formed on stopper 13 of closure element 5 through the thin membrane.

Due to the formation of two separate valve seats, each with a sealing surface 6 or 7, respectively, a tight closure of ventilation part 4 becomes possible with the fluid reservoir according to the invention. This closure is distinguished from measures for closing off the ventilation part in the container's bottom that were known from prior art by better leak tightness. Ultimately this makes it possible to set the container on the floor without paint present in the container leaking out. It is thereby made possible, in particular, to mix paint in the container before the container is then placed in the usual manner on the paint spray gun. The valve for closing off the ventilation part is further distinguished by the fact that closure element 5 can easily be removed manually from the container by pulling it off after undoing the snap connection. This makes it possible for excess paint that was not consumed in the painting process to flow out of ventilation part and be recycled if the container is held with the receptacle bottom facing downwards.

In an alternative embodiment, not shown graphically here, ventilation part 4 and projection 10 surrounding it is situated eccentrically relative to the longitudinal central axis of receptacle 1, i.e., ventilation part 4 as well as central axis A of projection 10 are eccentric relative to receptacle bottom 23.

Furthermore, the valve for closing off ventilation part 4 can be constructed such that it can be set to more than two valve positions. For this purpose it is provided, for instance, that more than two annular grooves 15, 16 are arranged on the outer side of hollow cylindrical base body 11. As an alternative to a plurality of annular grooves for forming a valve that can be locked in several positions, it is also possible for double annular grooves to be formed in parallel and with a distance between one another.